Amendments to the Specification:

Replace the paragraph beginning on page 2, line 6 with the following rewritten paragraph:

Stereo vision techniques are commonly used in multiple camera systems to recover spatial information of the scene. Such systems yield a 3D range image where the range values may not be defined at every pixel. Imaging systems that are capable of recovering range values at every pixel (full 3D range recovery) are known in the art. For example, Cyberware, Inc. manufactures a system whereby a laser is scanned across a scene. Another method described in U.S. Patent 4,953,616 (and further described in the Sandia Labe News, vol. 46, No. 19, September 16, 1994) provides a scannerless range imaging system using either an amplitude-modulated high-power laser diode or an array of amplitude-modulated light emitting diodes (LEDs) to completely illuminate a target scene. An improved scannerless imaging system that is capable of yielding color intensity images in addition to the 3D range images is described in commonly assigned, ~~copending U.S. Patent Application Serial No. 09/572,522, filed May 17, 200~~ U.S. Patent 6,349,174, issued February 19, 2002, and entitled "Method and Apparatus for a Color Scannerless Range Imaging System". As used herein, a scannerless range imaging system will be referred to as a "SRI camera" and such a system is used in producing both intensity and 3D panoramas.

Replace the paragraph beginning on Page 3, line 3 with the following rewritten paragraph:

Because of the nature of the SRI system, there is a further problem that must be addressed when merging two adjacent range images. The SRI system actually yields phase values that describe the phase offset for each pixel relative to one wavelength of the modulated illumination. These phase values are then converted to two types of ambiguity. First, if the objects in the scene differ in distances greater than one wavelength of the modulated illumination, the computed range values will reflect discontinuities where the corresponding phase values transitioned from one cycle to the next. This ambiguity problem can be solved by the method described in commonly-assigned, ~~copending U.S. Patent~~

~~Application Serial No. 09/449,101, which was filed November 24, 1999~~ U.S. Pat. No. 6,288,776, issued September 11, 2001 in the name of N.D. Cahill et al. and entitled "Method for Unambiguous Range Detection). Even if the first type of ambiguity is resolved, a second type of ambiguity exists. This ambiguity arises because the phase values returned by the SRI system do not contain any information about absolute distance to the camera. The information captured by the SRI system is only sufficient to generate relative range values, not absolute range values. Therefore, the absolute range values differ by the values computed and returned by the SRI system in the range images by some unknown constant. In general, the unknown constant for a given range image is not the same as the unknown constant for another range image. This presents a problem when attempting to merge/stitch two adjacent range images captured from the SRI system. If the unknown constants are not the same, it will be impossible to continuously merge the two images.

Replace the paragraph beginning on page 3, line 26 with the following rewritten paragraph:

Therefore, two problems emerge. The first problem is that the computed 3D values in a given image are not absolutely known; they are only known relative to the other objects in the same image. However, the constant offsets in subsequent 3D images may be different, and the difference in offsets must be determined in order to correctly merge the 3D values from neighboring scenes. Even if the first problem is solved, the 3D values of an object point in subsequent images are still dependent on orientation of the camera optical axis for each image. Consequently, distortion appears when a sequence of 3D images is used to describe the shape of an object. For instance, a smooth surface object in the three-dimensional space appears as a fragmented smooth surface object after reconstruction, using the untreated 3D images. Three methods have been shown to address the second problem in panoramic 3D map formation. Each method comprises transforming 3D values into some reference coordinate system. As described in commonly assigned, ~~copending U.S. Patent Application Serial No. 09/686,610, filed 11 October 200~~ U.S. Patent No. 6,507,665, issued January 14, 2003 in the names of Nathan D. Cahill and Shoupu Chen, and entitled "Method

For Creating Environment Map Containing Information Extracted From Stereo Image Pairs, a directional transaction transforms 3D values by projecting points to the common nodal axis. As described in commonly assigned, U.S. Patent No. 6,677,982 in the names of Lawrence A. Ray and Shoupu Chen, and entitled "Method for Three Dimensional Spatial Panorama Formation", an (X, Y, Z,) transformation transforms 3D values into 3-element vectors describing orthographic range to a reference system.

Replace the paragraph beginning on page 10, line 25 with the following rewritten paragraph:

Figure 10 shows the use of an SRI camera 10 in a panoramic imaging application. A single SRI camera 10 is mounted to pivot about a Y-axis (vertical axis) ~~50 through~~ centered about focal point 50 through a number of capture positions 54, each separated by an angle θ that provides an overlapping field of view between neighboring positions. The y-axis ~~50 is arranged~~ through focal point 50 is arranged to be coincident with the focal point 50 of lens 52 of the SRI camera 10. In this manner, a sequence of image inputs are obtained as the SRI camera 10 is rotated around the focal point 50 of the cameral lens 52, causing each successive image to slightly overlap its neighboring image. Since each input corresponds to an image bundle, a plurality of image bundles of the scene are acquired by rotating the SRI camera 10 about its Y-axis (vertical axis) ~~50~~, wherein there is an overlap region between adjacent image bundles. Although an SRI (scannerless range imaging) camera is used in the preferred embodiment, it should be understood that the invention may be used in connection with other types of range imaging systems, such as scanned systems, and the claims, unless specifically directed to SRI systems, are intended to read without limitation on any kind of range imaging system. Similarly, although the collection of image bundles is the preferred embodiment, it should be understood that the invention is not limited to any specific image collection. Moreover, there may be applications, e.g., in creating virtual images of small objects, where the SRI camera may be stationary and the "scene" may be rotated, e.g., on a turntable, in order to obtain overlapping images.

Replace the paragraph beginning on Page 12, line 17 with the following rewritten paragraph:

The notion of an image bundle is an important aspect of a preferred range estimation method using an SRI camera. As shown in relation to Figure 2, an image bundle 200 includes a combination of images captured by the SRI system as well as information pertinent to the individual images and information common to all the images. The image bundle contains two types of images: range images 202 related to the image capture portion of the SRI process and an intensity image 204, which may be a color image. Common information 206 in the image bundle 200 would typically include the number of range images in the bundle (three or more) and the modulation frequency used by the SRI system. Other information might be the number of horizontal and vertical pixels in the images, and/or date related to camera status at the time of the image capture. Image specific information will include the phase offset 1...N used for each (1...N) of the individual range images 202. The image bundle 200 includes a minimum of three such images, each of which are monochrome. The additional intensity image 204 is am image using an optical channel of the SRI camera that does not contain range capture components. For example, as disclosed in the aforementioned ~~Serial No. 09/572,522~~ U.S. Patent No. 6,507,665, which is incorporated herein by reference, a beamsplitter is used to establish two optical paths; one path contains the range imaging elements and the other path contains regular optics for transmitting the intensity (.e.g., color) image. An optical network (including light control means such as a shutter) recombines the image paths toward a single image responsive element, and a range image and a intensity image are separately, and sequentially, captured. Alternatively, the range imaging elements and regular optics may be interchanged in a single optical path. Although the intensity may be a color image, it is preferably, but not necessarily, the same size as the range images 202.

Replace the paragraph beginning on Page 15, line 23 with the following rewritten paragraph:

Figure 6 describes the process 112 (referred to in Figure 1), whereby an estimate for α is determined. In 600, an initial estimate for α is chosen; e.g., α=0. In 602, the right hand side of Equation 13 is evaluated, yielding $\hat{d}_2$, an estimate of the 3D range value in the right image. In 604, the 3D range images are warped according to the warp function *W,* and then they are registered using the pre-determined registration point 400. The error between the predicted $\hat{d}_2$ values and the actual d_2 values in the overlap region 406 of the warped registered images are computed 606 by calculating the difference $\hat{d}_2 - d_2$ at each pixel, squaring this difference, and then summing the squared difference values for all overlapping pixels. An inquiry is made 608 as to whether the errors (measured by the summed squared difference values) is acceptable. If the result of the inquiry is negative, a new estimate for α is chosen according to some optimization scheme 610 (e.g., Newton's method, line search, etc., see Fletcher, <u>Practical Methods of Optimatization</u>, 2nd Edition, John Wiley & Sons, 1987). A good choice is the Levenberg-Marquardt optimization scheme, which is described in the aforementioned Fletcher reference (pages 100-107). When the result of the inquiry 608 is finally affirmative, <u>the α constant offset difference is declared 612 and</u> the current estimate for α is chosen to be the relative range difference between the two images. According to 114 (referring to Figure 1), the relative range difference α is added to each 3D range value in the left image 500. Note that once the relative range difference has been applied, the range values in the left 500 and right 502 images will not be absolute; rather, they will still be relative, but with consistent constant offsets.